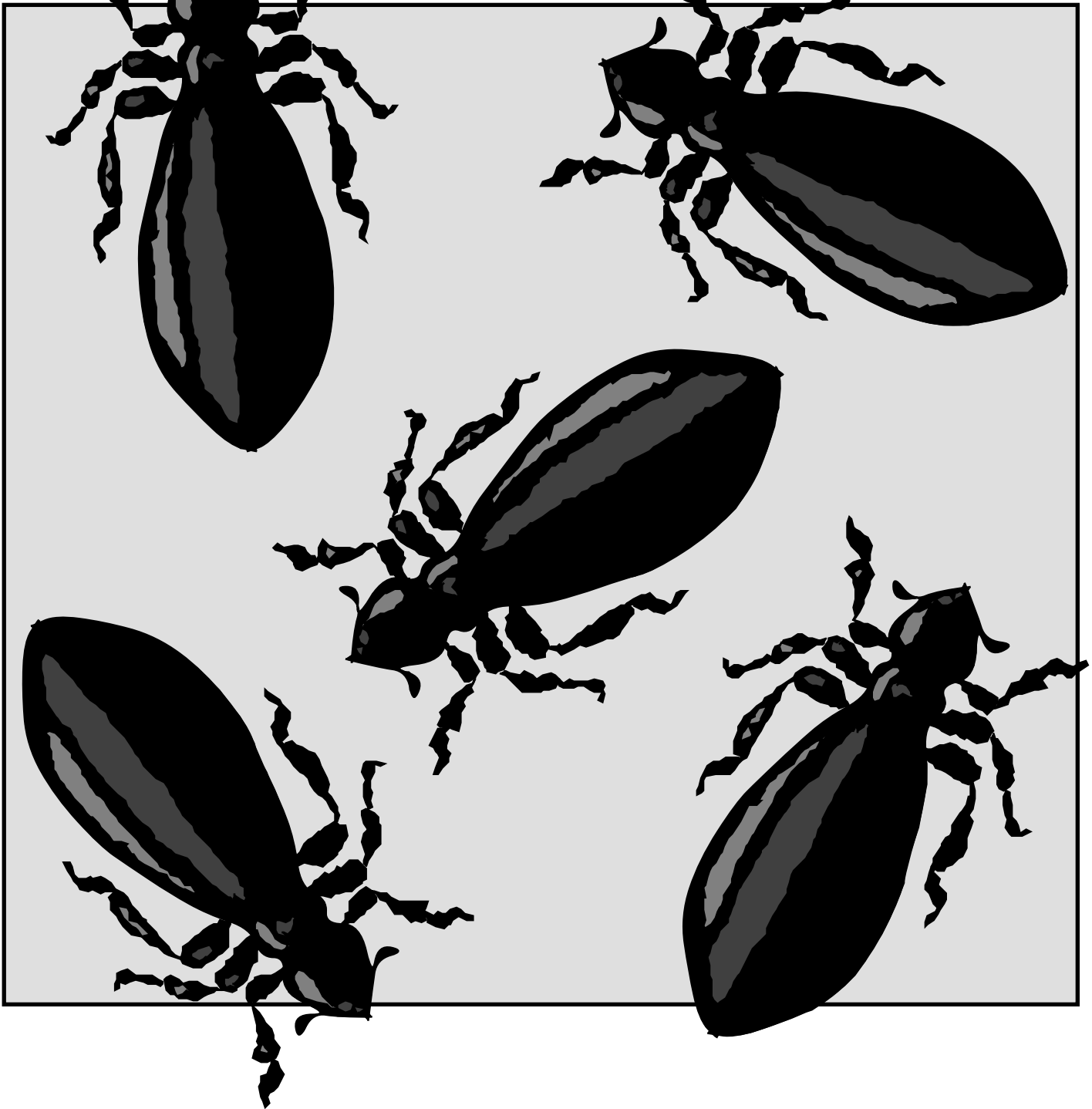


Livestock Pests Study Guide

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This material has been compiled from a variety of Extension publications from several states. The source publications are listed at the end of each pest or animal section. The contents offer an aid for preparation to take the state pesticide licensing examination on livestock pests.

For chemical recommendations, consult current local written guides and experts that will give you these and other pest management suggestions. For more detailed information on pest biologies, illustrations, etc., obtain the reference materials listed by writing Extension of the respective state university.

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CONTROL OF BITING FLIES ATTACKING CATTLE*

Biting flies cause losses to cattle during the warmer months when the adults are active. Cattle suffer reduced weight gains from the blood-sucking activity, reduced milk production, flesh loss from “brushing up” instead of grazing, and physical injury while trying to get relief from flies.

HORN FLY

The horn fly is a common pest of range and pasture cattle throughout the Pacific Northwest. Economic numbers of horn flies develop in June, and the flies are abundant during July, August, and September. Many cattle ranchers have found chemical control of horn flies essential for good herd management.

The small, bloodsucking flies cluster on the back, sides, and bellyline of all cattle breeds. A thousand or more flies may infest an individual animal. Feeding by the flies on animals results in considerable discomfort and annoyance, in addition to the loss of blood. Tormented cattle toss their heads, switch their tails, and rub through brush in an attempt to lessen the attacks of these flies. Heavily infested cattle do not graze during the day and “brush up” for long periods to avoid fly attack.

Single grazing season studies with yearling heifers and steers have shown increased weight gains of 15 to 50 pounds per animal when horn flies are controlled. When cows are heavily infested with horn flies, milk production may be reduced 10% to 20%.

Identification. The horn fly is about half the size of the common house fly. It is light gray and about 3/16 inch in length. It has piercing-sucking mouthparts. At rest, the head of the horn fly usually points downward. The wings are held flat over the back at an angle of about 60 degrees. The fly burrows among the hairs on the host to feed.

The flies are usually observed on the backs of cattle when the weather is cloudy or cool.

During sunny weather the air temperature seems to determine their location on an animal. As the air temperature rises in the morning, the flies are first observed on the sunny side of the animal, then on the shaded side and later on the under-side along the animal's bellyline.

As the air temperature lowers during the late afternoon and evening, the flies return to the sides and back of the animal. When disturbed, they will fly up in a swarm but return quickly to individual animals.

Life History. Adult flies spend their entire life on the host, except when the females leave to deposit eggs on fresh, undisturbed cattle droppings. The eggs hatch in approximately 24 hours. The maggots complete their development in the droppings within 4 to 5 days and the mature maggot transforms into an adult fly in 5 to 7 days. The life cycle from egg to adult usually takes 10 days to 2 weeks depending on temperature and moisture conditions. Many generations overlap each summer. Horn flies spend the winter as maggots or pupae beneath cattle droppings.

STABLE FLY

Stable flies are distributed throughout the Pacific Northwest. Mostly a pest around fenced pastures and feedlots, they generally are not a problem in range situations. They are most abundant from midsummer through autumn.

These flies are vicious biters. They frequently change positions or move to several animals to feed. The behavior of interrupted feeding increases their annoyance factor. Stable flies feed mainly on the legs of cattle and appear resting on sunny or light colored surfaces.

Identification. Similar in appearance to house flies, stable flies are brownish gray with broken stripes on the thorax. The abdomen is checkered in appearance and shorter than the abdomen of the house fly. Wings of stable flies

when at rest are held in an angular position similar to horn flies. Their prominent proboscis protrudes forward in front of the head.

Life History. The female lays small white eggs in decaying organic matter. Eggs sometimes will be laid in manure mixed with straw but soggy hay, grain, or straw around feed bunks are preferred for oviposition. In 3 days the eggs hatch into typical maggot-type larvae. After feeding for 2 to 3 weeks the larvae crawl to drier areas of the food source and pupate. Adult flies emerge from the pupa in 9 to 13 days. The egg to adult period averages 35 days. Most adults live around 3 weeks during the summer. Winter is passed as a larva or pupa.

TABANIDS, MOSQUITOES, AND BLACKFLIES

Several different kinds of tabanids (horse flies and deer flies), mosquitoes, and blackflies (buffalo gnats) attack cattle in summer pastures or under range conditions. A few horse flies per animal can excite cattle and cause considerable trouble, whereas cattle generally tolerate fairly large numbers of mosquitoes and blackflies. Actual weight loss, blood loss, or other damage caused by these flies has not been measured in Washington. However, various studies in other areas show that losses can be considerable when livestock are under heavy attack. Control measures specifically for these insects have been impractical to date. However, controls for horn fly will give some control of tabanids, blackflies, and mosquitoes.

Tabanids. Horse fly and deer fly larvae develop in damp to wet soil at the edges of streams and lakes and in marshy areas. Larvae range from saprophytic to predaceous. Predaceous species feed on other insects, earthworms, snails, and crustaceans. Usually 1 year is spent in the larval stage with adults emerging from late spring throughout the summer, depending on the species. Like mosquitoes, only female tabanids feed on blood and bite only during the daytime. Adult females live about 2 weeks to a month,

depending on temperature. They are strong fliers and may be bothersome a mile or more from their breeding sites.

Mosquitoes. Most adult female mosquitoes must have blood meals to develop eggs. The eggs are laid in or near water and the larvae live in various aquatic habitats. Some species of mosquitoes develop in snow melt pools in mountain valleys and meadows. Some develop in overflow or seep pools next to creeks, rivers, or irrigation canals. Others are found in septic tank overflows, rain puddles, and water-filled artificial containers. Eggs are laid on the water surface or moist soil. Once in the water or covered with water (in the case of eggs laid on the soil) the eggs hatch in 3 to 4 days. Larval development takes from 5 days to 3 weeks. The pupal stage lasts 2 to 4 days before adults emerge. Mosquito adults live 2 to 4 weeks or more, depending on temperature. Mosquitoes bite during day or night, depending on species.

Blackflies. Buffalo gnats breed in running water and are present in streams as well as certain irrigation canals. Eggs are laid on rocks or trailing vegetation or dropped onto the water surface. Eggs hatch within a few days. Depending on the species, water temperatures, and food availability, larval development takes from a month to a year. Most species in mountain streams have one or two generations per year. Those species breeding in the warmer irrigation canals can produce three to five generations per year.

Large numbers of blackfly adults have killed livestock in Canada due to blood loss and toxemia. Adult blackflies bite only in the daytime. Under moderate blackfly attack, cattle will lie down, "brush up," or stand in water to avoid blackfly attacks. Feeding is interrupted and milk production decreases. Blackflies are particularly hard to control because the adults can move far from breeding sites. Control generally uses chemicals to kill the larvae. This type of program has been successful in certain states for controlling blackflies attacking sheep. Cattle in the treated areas also are protected.

OTHER BITING FLIES

Other biting flies such as punkies and snipe flies bite cattle and other livestock. Little is known about the economic importance in general except that if they were numerous they probably would cause many of the weight loss problems, etc., that our common horn flies, etc., cause. Some of the punkies do act as vectors for the infamous blue tongue virus.

BITING FLY CONTROL

Several methods are available for control of biting flies. Most of these methods use insecticides, but prevention and sanitation can be used in certain situations.

Prevention and Sanitation. This method of control is applicable mainly to the stable fly in feedlot situations. The stable fly can be virtually eliminated by keeping spilled grain and unused hay, straw or ensilage cleaned up or by fixing leaking faucets, water troughs, etc. Elimination of a breeding site is the purpose of this type of control measure.

Removal of manure to prevent horn fly breeding is impractical because the sites are isolated cow "pats."

Sprays. Sprays are useful in feedlots, but spraying is not always a practical method of horn fly control when cattle are on summer range or pasture. The time and labor required to gather widely scattered cattle, the weight loss caused by handling them, and the stress caused by treatment may outweigh the benefits of controlling horn flies. Spraying is also a temporary measure and must be repeated several times during the fly season. Sprays are useful along with sanitation for controlling the stable fly.

Pour-ons. Fly control with pour-ons is basically the same as with sprays; the effects are temporary and cattle must be handled. The only advantage of pour-on formulations over sprays is their ease of application.

Feed Additives. These insecticides are designed to pass through an animal's digestive

tract and kill fly larvae in the manure. Only the horn fly and face fly can be killed using this method. Additives can be mixed directly with feed or set out in mineral or salt blocks for range herds. A major problem with additives is getting the proper amount per day per animal. Fly control is erratic because salty range vegetation and other factors affect how much additive is consumed. A great deal of effort must be expended to make additives work properly.

Dust Bags. Dust bags containing biting fly insecticide provide a practical method of control under many conditions. This method has the fewest disadvantages and is very economical.

Dust bags are readily accepted when placed in an area where cattle congregate. If some animals in a herd refuse to use dust bags, forced use by placing the bags between pasture and water or salt usually improves their effectiveness. Forced use should be a common practice.

Dust bags should hang level and be separated by a 6-inch space between bags. Use a strong cord to secure the bags to a cross. Allow 8 to 10 inches between the pole and the bags so the bags swing freely when cattle move under them. Hang the bag so the bottom is approximately 38 inches from the ground. This will permit the animal to treat its head and backline. Use a minimum of one dust bag for every 25 head of cattle.

Check the bags often when they are first put into use. Some animals may overwork bags in confined areas and waste dust. Only bags with an adequate supply of insecticide dust will allow the animals to properly treat themselves. Bags should contain 8 to 10 pounds of insecticide.

Homemade bags should consist of a double burlap bag, 30 x 20 inches, and a polyethylene lining sewn inside the top two-thirds of the burlap. The plastic will protect the insecticide dust from excessive moisture. Three grommets at 10-inch intervals at the tip of the bag aid in proper hanging. Sew two vertical seams,

each 20 inches long across the bag from the bottom up to create three pockets. This helps prevent excessive dust loss in the event of a tear in the bag. Dust bags often are too high for small calf use, but control on the larger animals should control the herd population. Also, if horned animals are in the herd, you may have to use backrubbers.

Backrubbers. Cable-type backrubbers are useful for controlling biting flies in range situations. They must be placed properly, since cattle must use backrubbers daily for best results. This can be achieved by forcing cattle to use them to reach minerals, salt or water.

Backrubbers are fairly effective in fly control but may be difficult to install. They also require frequent maintenance for recharging and repair and are relatively expensive. However, they have a good use if you have horned animals in the herd, because horned animals will occasionally rip dust bags. Erect a backrubber when dust bags, spray, and dust treatments are not practical to prevent biting fly attack. Their use also will prevent louse buildup and aid in winter louse control.

Commercial models are available. Or you can construct an effective simple backrubber by installing braced posts 15 to 20 feet apart with an eye bolt 4 feet above the ground. String a cable, twisted wire or chain between the poles and wrap it with layers of burlap sacks to about a 3-inch thickness. Tie the burlap to the cable with twine at 6-inch spacings. The

middle portion of the backrubber should be 18 to 20 inches above the ground. Soak the burlap sacks with a solution of insecticide and oil every 2 weeks.

About 1 gallon of insecticide-oil mixed solution per 20 linear feet of cable will be needed to wet the sacks. Mix chemicals with No. 2 diesel fuel or furnace oil. Never use crankcase oil because it can cause severe blistering of the skin, and excessive amounts can cause illness or even death. Commercial backrubbers require recharging periodically.

Eartags. Eartags, containing synthetic insecticides and designed for slow release are extremely effective against many of the flies mentioned. They can be used in a variety of ways depending on allowance set forth by the label.

CHEMICAL CONTROL—CAUTION

Many effective chemicals are registered for biting fly control and several methods of application. Read and heed all labels and precautions and restrictions on each product. All pesticides are poisonous and must be handled with care to protect the applicator, livestock, adjacent property, and the consumer. Keep accurate records of the pesticides you apply.

*Modified from "Control of Biting Flies Attacking Cattle," CIS 515, by R.L. Stoltz and H.W. Homan, University of Idaho, 1979.

CATTLE GRUBS AND THEIR CONTROL*

Cattle grubs, *Hypoderma* sp., cost the beef industry over 200 million dollars annually. Besides cost of control, losses result from poor gain by infested animals or from paralysis which may occur when grubs migrate through the spinal canal. Occasionally secondary infection may develop in grub emergence holes. On slaughter animals, grub damage in loin muscles causes trim loss and downgrading of carcasses. Hides of grubby cattle are peppered with holes in the thickest, most valuable part of the hide. The adult stage of cattle grubs causes economic losses from gadding the cattle (running from the insects) because the animals do not graze properly or can injure themselves running, and from milk reduction for calves.

LIFE HISTORY

The adults are known as heel flies or warble flies. In the Pacific Northwest, they generally appear in early summer. Two species are involved. The northern cattle grub lays its eggs singly on hairs on the lower part of the animal's body. The common cattle grub attaches her eggs in the same areas, but may attach as many as a dozen eggs to a single hair. Adult flies do not feed so they live only 3 to 10 days. Cattle will often flee in panic from an egg laying female cattle grub. This is called "gadding." We do not know why cattle fear the fly because it can't bite or sting.

The eggs hatch in about 4 days, and the tiny larvae crawl down the hair and penetrate the skin. Where several larvae have entered the skin at the same place, a reaction called "hypodermic rash" develops. Infected animals constantly lick and scratch these spots and do not feed normally. The grubs suffer very high natural mortality during their development because of the natural resistance of older hosts. Cattle of all breeds are the normal host, but occasionally horses are attacked. Calves and yearlings tend to have more grubs than older stock.

Little is known about the larvae after it enters the animal's body but in 1 to 2 months the

small common cattle grubs have migrated to just beneath the lining of the esophagus. Small northern cattle grubs appear in the spinal canal after that same time interval.

The grubs live in those locations for about 6 months (during the winter) and then migrate to the topline of the animal. When the larva first arrives in the back, it cuts a small breathing hole in the hide, then molts in a pouch—a warble—between the inner and outer layers of skin. After growing rapidly for 6 to 8 weeks, the fully grown larva enlarges the hole, exits the warble and falls to the ground. There it crawls under some object and transforms to a pupa. The pupal stage lasts 2 weeks to 60 days depending upon the weather. The adult female then emerges, mates, finds a host, and lays eggs. Male cattle grubs occur at topographic aggregation sites.

CONTROL

Area-wide grub control programs are much more effective than individual efforts. If everyone treats grubs, grub populations will be low enough to diminish gadding the following year, and eventually populations will be low enough that treatment may seldom be necessary, unless grubby cattle are imported.

Control of grubs can be achieved easily and effectively using systemic insecticides at the proper time. Application should be timed to kill the grubs during the 30- to 60-day early migration period after heel fly activity has stopped. This will kill the grubs before they reach the gutt or spinal column.

Dipping and pour-on application methods are much more convenient and practical than spraying. Spraying will work effectively but is not a convenient method of application. Treated mineral block or treated ration is effective only when animals can get regular dosages.

Cutoff Date and What It Means. Cattle heavily infested with large, first-stage grubs when they are treated can be injured and

sometimes killed by the reaction of their body to the dead grubs. To minimize this problem, treat immediately after heel fly activity is over in your area, usually mid to late summer but no later than after the first killing frost of the fall.

Reaction to the common cattle grub can cause the gullet to swell until it is closed and the animal bloats. Reaction to the northern cattle grub can cause paralysis of the hindquarters. Observe cattle for side reactions for 48 hours after treatment. If these symptoms persist consult a veterinarian. Symptoms to look for are stiffening of hindquarters, bloat, and excessive salivation.

PRECAUTIONS

Cattle grub insecticides are cholinesterase inhibitors and should not be used in conjunction with or within a few days after treatment with other drugs or insecticides having cholinesterase inhibiting activity. Read, heed, and completely understand the pesticide label before use. Each chemical listed has special precautions about its use in relation to animal health, other drugs, days between applications and slaughter, and other special instructions. By following label instructions, good cattle grub control can be obtained with minimal risk to animals or applicators.

CAUTION—POISON

All pesticides are poisonous and must be handled with care to protect the applicator, livestock, adjacent property, and the consumer. Read and follow the label carefully each time a material is used. Keep accurate records of the pesticides you apply.

For grub control on dairy cattle, consult local current recommendations for differences between beef and dairy animals (e.g., lactating animals should not be treated with systemics). Grubs can be hand removed by carefully squeezing them out of the enlarged warble pore when dairy animals are inspected daily. If hand removal is employed, take extreme care NOT TO BREAK THE LARVA while doing so. Breaking the grub in the hole could send the animal into shock.

*Modified from "Cattle Grubs and their Control," CIS 512, by R.L. Stoltz and H.W. Homan, University of Idaho, 1979.

FACE FLY CONTROL ON BEEF CATTLE*

The face fly is a pest of range and pasture livestock in most areas of Washington. This fly poses a serious problem to cattle because it is associated with a high incidence of eye disorders.

This nonbiting fly feeds on the moisture and secretions about the eyes and muzzle of cattle, horses and sheep. Its feeding habits cause increased tear production and eye swelling. The face fly is involved in the mechanical transmission of disease organisms to the eye. In addition, it will feed upon blood or exudate (ooze) from fresh wounds and saliva deposits.

The presence and feeding of this persistent insect also cause extreme annoyance and irritation to its hosts. Infested livestock may bunch together or seek dense shade and refuse to feed. Face flies usually are not a pest of confined cattle unless they are adjacent to pastured cattle.

The face fly is also a household pest because of its habit of hibernating in attics and interwall areas of houses, barns, churches and other buildings. On warm days during the winter and early spring, they move into living areas, sometimes in great abundance, and become active pests.

HABITAT AND LIFE CYCLE

Face flies were first found in Washington in the mid 1960s. They now occur throughout the state. Natural enemies have stabilized the populations since that time. However, because face fly populations can increase rapidly, check their numbers on cattle often.

Face flies are troublesome on livestock during most of the summer. The flies prefer bright sun-shine and usually do not follow livestock into dense shade or buildings.

Eggs are laid only in undisturbed, fresh cattle droppings. Face fly maggots develop in the droppings, pupate in dry areas of droppings or in the surrounding soil, and emerge as adults. Development from egg to adult requires 10 to 21 days under ideal conditions. Successive

generations occur during the warm months of the year.

CONTROLS

Face flies are able to move long distances in a short time, so "treated" livestock may be continually reinfested. In addition, less than 5% of the face fly population is found on livestock at any one time. Thus, effective control requires repeated insecticide applications to the faces of animals during the season. The effective control period of each treatment is only 3 to 5 days. This is difficult to achieve unless animals are handled every day, as in the case of lactating dairy cows, or unless effective self-application insecticide dispensers or devices are used. Face flies are susceptible to many insecticides.

For beef cattle on rangeland and for most pastured stock, ear tags or ear tag tapes, properly constructed back- and face-rubber combinations, or dust bags should reduce face fly numbers and control horn flies.

Spraying or dipping is an effective but not a practical method of control on beef cattle. Ear tags and ear tag tapes are very effective. The tags are placed in the ear, and the ear tag tapes are wrapped around existing ear tags. Control is much more effective for face flies when one tag is used in each ear rather than one per head or one per cow-calf pair as used for horn flies.

If self-treating devices are used, the animals must be forced to use them, and the applicators must be constructed so that the faces of the animals are treated. Devices can be put up in doorways, on corral gates, above salt-mineral boxes, between pasture and water, etc., where animals are forced to use them frequently.

Many commercial applicator units are available. Some are constructed so that animals treat their own faces. Others are designed only for horn fly control and are less effective in controlling face flies.

Some feed additives give varying degrees of face fly maggot control in cattle droppings. Adequate face fly control seldom is achieved by this method, however, because treated herds are continually subjected to reinfestations of face flies from untreated herds. For successful control with this method alone, a herd would have to be isolated from other infested livestock by considerable distances or natural barriers.

Many of the same techniques can be used for face flies on dairy animals; however, there are

stringent restrictions with use of many of the chemicals where dairy animals are concerned.

It is best to check current local recommendations to see what the lactation or freshening restrictions are for any chemical when considering treating dairy animals with pesticides.

*Modified from "Face Fly Control on Beef Cattle," CIS 565, by H.W. Homan and R.L. Stoltz, University of Idaho, 1983.

CATTLE LICE AND THEIR CONTROL*

Lice cause losses in all types of beef cattle operations. Animals that develop extremely large louse populations may abort or die from anemia caused by blood loss, but the major loss results from poor feed conversion. Lice are primarily a wintertime problem because self-grooming, sun-shine, rain, and short summer hair coat make poor conditions for their development. Cattle breeds also differ in susceptibility.

In cow-calf operations, lousy cattle will produce less milk and will wean lighter calves. Cattle ranchers will find that lousy cattle require more feed for each pound gained. Louse-infested cattle appear unthrifty and have dry looking skin. They also damage fences, corrals, and feeder bunks by rubbing on them to relieve the irritation caused by lice feeding. Cattle are the only host of cattle lice. Usually, 1% or 2% of the cattle in a herd are carriers that will harbor lice year-around. Bulls are often carriers since they have a denser coat and cannot self-groom as easily as the other cattle. Lice spread by contact from carriers to other animals in the herd. Cattle lice spend their entire life on the animal and will live only a few days off the host if removed. Lice can pass from egg to adult in 3 to 4 weeks. Eggs that fall off the host will not hatch unless the weather is hot and then the young must find a bovine host within 2 days or they will die.

Each time cattle are handled in winter and early spring, they can be quickly examined for lice. Part the hair with your fingertips and examine the animal in several places, including the neck, withers, brisket, shoulders, midback, tailhead, and behind the rounds.

The Pacific Northwest has four species of lice that infest cattle. Three of these species feed by piercing the skin and sucking blood. The shortnosed cattle louse is normally found as a pest of adult animals. The longnosed cattle louse infests calves most heavily but often is found on mature animals in low numbers. The little blue cattle louse is found on all ages of

cattle. The fourth species, the cattle biting louse, feeds on the scales of the skin and causes irritation. It is reddish instead of blue like the bloodsucking lice, and it usually is found at the base of the tail or withers of cattle of all ages.

CONTROL

The major factor in louse control is self-grooming. Stanchioned cattle will control their own louse populations by self-grooming within 3 days following release of the cattle.

Only about 5% of the cattle in a herd benefit from louse control. Herds routinely treated for cattle grubs, horn flies, ticks, or face flies may not develop louse infestations at levels that require treatment. If grubby cattle are to be treated for lice, use a systemic insecticide after the first frost in the fall. Do not use systemics at later times due to threat of anaphylactic shock. If treatment for lice is needed in late fall or early winter, use a nonsystemic insecticide. Systemics will not kill lice that are not feeding or eggs of lice. A second treatment may be needed in herds with heavy infestations.

SANITATION

Following simple sanitation practices will help you limit the spread of lice in your cattle. Isolate newly purchased animals and examine them. If they have lice, treat them before you move them into the herd. If bedding, feeder bunks, sheds, or trucks have been contacted by lousy cattle, keep other cattle away from them for 2 to 4 days or sanitize them before reuse (e.g., hose off these items with very hot water).

*Modified from "Lice on Beef Cattle," CIS 538, by H.W. Homan and R.L. Stoltz, University of Idaho, 1980.

SCABIES ON CATTLE*

Scabies, or scab mange, is a skin condition caused by the feeding of three kinds of tiny, parasitic mites in the skin of cattle and other animals. The disease takes its name from the scabby appearance of infested animals. Body fluids ooze from the feeding wounds caused by the mites and an obvious dermatitis develops. Mites are active on cattle all year, but the scabby condition they cause is most severe in winter.

Another reaction of the cattle to mite infestation includes a generally unthrifty condition. Up to 100 additional days feeding may be required to bring infested cattle to marketable condition. Cattle stressed by a mite infestation also tend to be more prone to respiratory problems, such as pneumonia. When infested cattle are slaughtered, scars on the hides result in lower hide prices.

Scabies is quarantinable and cattle exposed to infested livestock or facilities also may be quarantined. Quarantine regulations require cattle workers not only to dip infested cattle, but also to disinfect and clean corral facilities and trucks used to haul infested animals. Complying with overall quarantine regulations is a burden that is very costly.

DETECTION

You should be constantly watching for signs of scabies in your cattle. Generally, you will see the scabby condition of animals only in advanced cases, so be alert for early signs that indicate infested animals. Rubbing and scratching against a corral fence or other object is typical. Constant tail switching or licking areas of the body may also indicate a scabies infestation. When hair on an animal is obviously disturbed from licking or rubbing, or when you find hair patches on fences, examine the cattle for mites as well as lice.

You can see cattle lice easily when you hold cattle in a squeeze chute and pull the hair back to expose their skin. Scabies mites, however, can only be detected by a thorough

examination of deep skin scrapings at the edges of the inflamed scab area by an experienced person. The examination requires special preparation of the scrapings and a microscopic diagnosis.

QUARANTINE AND ERADICATION

Cooperative state and federal programs have reduced the incidence of scabies through quarantine and eradication. All cases of scabies reported to state regulatory agencies are investigated to determine the source of the infestation and the possibility of contact of infested animals with noninfested animals. When an infestation involves movement of animals across state lines, the Animal and Plant Health Inspection Service of USDA determines the proper course of action for management of a potential outbreak. Veterinarians from state and federal regulatory agencies can provide specific information on quarantine and eradication programs.

TYPES OF SCABIES

Three types of cattle scabies occur in the West, and each is caused by a different mite—the psoroptes, sarcoptes, and the chorioptes. Cattle may be infested with any one species or combinations of these tiny mites. These mites are barely large enough to be visible to the unaided eye against a black background. Each requires 10 to 12 days to complete a life cycle and each lives on or within the skin tissues of the animal where feeding and reproduction occur.

The most severe form of scabies is caused by psoroptic mites. The initial infection site for psoroptic scabies is usually where the hair is thick, as along the top-line of an animal from the withers to tailhead. Sarcoptic mites frequently will first infest an animal above the rear portion of the udder or scrotum or on the inner surfaces of the thighs where the hair is very thin. Chorioptic mites, the cause of the most common form of scabies, also have a tendency to produce their first lesions in these same areas.

CONTROL

Dipping vats and spray-dip machines provide the only effective control of scabies in cattle. Pour-ons will not adequately control scabies. Using a dip vat is the preferred method of treating cattle infested with scabies.

Two types of dip vats are common. One is the common swim-through vat, usually metal, concrete or portable. Cattle enter one end of the vat and swim to the other end, where they can walk out. During treatment, the cattle must be fully submerged at least once. The other type of cattle dipping vat is the cage vat. In this device, the cattle are driven individually into the cage and the captive animal is completely immersed into the solution by hydraulic or mechanical means.

Spray-dip machines are difficult to operate, waste a great deal of the spray solution and have a tendency to plug with hair and extraneous materials that enter the recirculation system. Most people who have used spray-dip machines feel that they are not a desirable method.

Only a few insecticides are allowed for treatment of scabies in quarantine programs. These and their instructions for use should be obtained from your local recommendations source.

Dipping cattle is an effective control only if you prepare carefully. First, install the dip vat properly and keep it maintained. You must also maintain proper insecticide concentrations in the dip vat solution and ensure adequate mixing of the dip vat solution before treating the animals. Clean and disinfect corrals, fences, work areas, and trucks that have been used by scabies-infested animals. And when cattle are dipped in extremely cold weather, you should drive them a moderate distance to dry them after they have been dipped to prevent chilling.

Give cattle showing symptoms of scabies special handling during the dip process. Lesions on the animals may be hand-treated with the dip solution immediately before dipping to ensure that they get a very thorough treatment. Hard scabs should be broken up so that the dip can reach the mites below the scab.

Note: When disposing of vat contents after treatment, take precautions to ensure that the pesticide contents are placed in a legally and environmentally acceptable disposal site.

*Modified from "Control of Scabies on Cattle," CIS 566, by C.D. McNeal, Jr., R.L. Stoltz, and H.W. Homan, University of Idaho, 1981.

MANURE FLY CONTROL FOR DAIRY FARMS AND POULTRY HOUSES*

The most common pest flies encountered in livestock quarters are the common housefly, *Musca domestica*, and the lesser housefly or “hover” fly, *Fannia* spp. Sanitation is the first and most important step in controlling flies. Sanitation is cheaper than relying on insecticides and eliminates residue problems or immunity buildup.

- Eliminate breeding areas. These flies breed in moist areas; straw and manure; moist, spilled feed and malt; manure drains or leaking water cups; and decaying vegetation around the premises.
- Certain manure management practices provide for manure storage under cages of poultry houses for long periods. If this is done in a manner where manure is subject to constant drying (which renders it nearly uninhabitable by flies), then the fly problem will be kept to a minimum. If this is not possible, then weekly removal of manure supplemented by pesticide applications may be the only avenue. Flies also may be controlled by flooded lagoon holding of manure.
- Where practical, spread manure thinly over fields under drying conditions, or heavy applications disked or shanked as liquid manure into the soil within 24 hours.
- Begin fly prevention programs early in the season. Once flies are established and population levels build up, control becomes difficult, and nuisance problems for the surrounding public become quite unpleasant.
- Keep entryways clear of garbage cans or other fly-attracting material. This will reduce the number of flies entering when doors are opened. Keep garbage or organic refuse cans tightly covered.

- In poultry operations, collect dead birds daily and place in animal- and fly-proof enclosures. When necessary, sanitation can be supplemented by commercially available biocontrol agents or by proper use of approved insecticides.
- Use only recommended pesticides. Many insecticides are not approved for use on dairy or poultry operations. Also, flies often are resistant to insecticides. Such resistance becomes readily apparent when the same insecticide is used repeatedly.
- Avoid contaminating water, feed, and feed troughs with insecticides.
- Follow directions so that cattle or birds are not in contact with insecticides that can be absorbed and transmitted to the milk or eggs. Concentrate treatment in resting areas identified by fecal spots (fly specks).
- Larvicides applied to manure are generally not effective in poultry houses because fresh manure constantly dilutes and covers the treated area. Biocontrol agents can also be effective, especially when integrated with other strategies.
- Physical trapping of flies also will greatly reduce adult fly activity (“Bishop” type fly trap). Check with a fly expert on this type of control effort.
- Protect the pesticide applicator with gloves and proper clothing. Use only as directed. Inside sprays and outside sprays are not to be confused.

*Modified from “Fly Control for Dairy Farms and Poultry Houses,” EB1021, by A.L. Antonelli, Washington State University, 1982.

POULTRY PESTS AND THEIR CONTROL*

Lice, fleas, and mites in particular are the most common pests in poultry in Washington. Infested birds have scaly, scabby skin and discolored or ragged feathers. They also lose many feathers. They also may have deformed feet.

Consult current local pesticide recommendations when a pest problem occurs. Well planned and constructed poultry houses and good sanitation make control easier.

POULTRY MITES

Chicken Mite. During the daytime these mites stay in cracks, crevices, and other protected places. At night they crawl upon the birds to feed. Their only food is the blood of the birds they infest.

Since these mites rarely stay on the birds during the daytime, a flock may be badly run down without the owner being aware of the cause of the trouble. In cases of heavy infestations, the birds become droopy, pale about the head, and listless. They may stop laying.

Northern Fowl (Feather) Mite. This mite resembles the chicken mite, but it breeds among the feathers and spends its entire life on the bird. The presence of the mites often is first noticed on the eggs. Mite eggs and excrement will be found among the feathers, especially about the vent and tail.

These mites cause annoyance, loss of blood, and unthriftiness in infested birds. English sparrows also are infested with these mites. Destroying their nests and spraying their nest sites around poultry houses is suggested.

Depluming Mite. This mite lives at the base of the feathers. It appears to produce an intense itching, causing the birds to pull out their feathers. If you examine the stumps of the feathers soon after the quill is broken, you will find them surrounded by scales and crusts. These mites become active in the spring and usually disappear in winter.

Scaly Leg Mite. This form of itch mite causes a condition known as scaly leg. While it usually occurs only on the legs, the mite may attack the combs and wattles. The infestation is easy to recognize by the enlargement of the feet and legs and their rough appearance. In severe cases, the joints become inflamed and the birds become lame.

POULTRY LICE

Lice on poultry do not suck blood, but feed by nibbling or chewing dry skin, scales, feathers, or scabs on the skin. Several kinds of lice attack birds in Washington. Some of the most important are the chicken body louse, the shaft louse, and the chicken head louse.

Chicken Body Louse. This louse lives most of the time on the skin, mainly in the areas around the vent and under the wings. It is common on both young and old birds.

Shaft Louse. The shaft louse, or common body louse, is similar to the chicken body louse, but smaller and paler colored. It is common around the vent as well as on the back and breast. It tends to cling to the feathers rather than to the skin of the bird. This louse does not infest young chickens.

Chicken Head Louse. This louse is a problem mostly on young birds. It occurs on the head at the base of the feather or down. It passes from one chicken to another by contact.

FLEAS

Several kinds of fleas may occasionally infest birds, but only one kind, the western hen flea, is a problem in Washington. It breeds in the soil, principally in droppings, and does not infest birds except for brief feeding periods.

DARKLING GROUND BEETLE

The "mealworm" stage of this beetle occasionally burrows into the flesh and

internal organs of dead or dying chicks of 2 or 3 weeks of age. This insect has also been shown capable of transmitting leucosis in broilers.

Full-grown larvae are brown banded, sausage shaped, more pointed at one end, and about $\frac{3}{16}$ inch long. The adult beetles are the same length and brown-black in color.

CONTROL

Obtain information on control of poultry pests from current, local recommendations.

*Modified from "Poultry Pests and their Control," EB0912, by A.L. Antonelli and D.K. Andrews, Washington State University, 1981.

CONTROL OF SHEEP KEDS (AND OTHER PESTS OF SHEEP AND GOATS)*

The sheep ked or sheep “tick,” *Melophagus ovinus*, occurs on sheep in most sheep-raising areas of the world. In the United States, it is most abundant in the West.

SYMPTOMOLOGY AND ECONOMICS

The sheep ked is a pest only of domestic and mountain sheep and goats. No alternate host animals and no free-living stages exist. Other species that appear on birds and deer will not infest livestock.

Keds generally infest the neck, breast, shoulders, belly, and thighs, and can be easily detected by parting the wool. They pierce the skin and neck and suck blood, causing great irritation to the sheep and forcing them to scratch and bite at themselves. Scratching results in wool tags left on fence wires.

Heavily infested animals become weak and unthrifty and show weight loss, anemia, wool staining, reduced resistance to disease, and a condition called “cockle.” Cockles are raised bump-like skin blemishes caused by ked bites. They reduce the value of the skin.

Young animals are the most susceptible to ked infestation, because keds migrate to the lambs after ewes have been sheared. In some areas, up to 25% reduction in fleece yields has been noted.

DESCRIPTION AND LIFE HISTORY

The sheep ked is frequently called a sheep tick, but is a true insect (a wingless fly) rather than a tick. It represents a family of flies that are parasitic on such animals as birds, deer, goats, and sheep. Most species prey on birds.

The sheep ked spends its whole life cycle on the host. Sheep keds that become dislodged do not usually pose a threat of reinfestation to

other sheep. Dislodged keds only live about 4 days off their hosts. Spread is almost entirely from sheep to sheep, although humans (shearers, etc.) can help to spread them.

The ked is ticklike in appearance, about $\frac{1}{4}$ inch long, and reddish or gray-brown. It does not lay eggs. Eggs are retained in the female and hatch there. The young larva remains within the female ked, feeding from special nutritive glands until it is fully larva developed. Only one develops at a time. When full development is reached, each larva is expelled and almost immediately forms a puparium that attaches to the wool.

The puparium is barrel-shaped, dark reddish brown, and about $\frac{1}{8}$ inch long. During warm months, the adults emerge from the puparium in about 3 weeks; about 6 weeks are required during cold months.

Female keds live for about 5 to 6 months, during which they may produce up to two dozen young at a rate of about one every 7 days.

Ked populations build up during the fall and early winter months, begin to peak during the first of the year, then decline until early summer. The decline is associated with resistance of the sheep at this time.

CONTROL

Several insecticides registered for control of sheep keds on sheep are listed in local Extension publications. Sheep can be sprayed, sprinkled, dipped, or dusted. The best time to treat sheep is in spring, after shearing, when the wool is short and shear cuts have healed. Sheep sprayed during cold weather are more subject to stress.

If liquid treatments are used, allow time for drying before evening. Do not spray animals when daytime temperatures are below 40°F.

MANAGEMENT SUGGESTIONS

Small Farm Flocks. Sheep keds can be easily controlled in small farm flocks by attaching a dust bag in a barn opening used by the flock. Close other barn accesses to force use of the dust bag by sheep as they enter and exit.

Dust bags should contain a recommended pesticide and may be a commercial product or simply made from two burlap bags placed one inside the other. Hang the dust bag at the height of the animal's shoulder. When treating just a few sheep, hand sprinkling, hand dusting, or a pour-on treatment are probably the most convenient methods of control.

Commercial Flocks. Large commercial flocks can be treated for infestations most economically by dipping or spraying after shearing, and spraying again in the fall.

OTHER PESTS

Lice. Several species of sucking and chewing lice infest sheep and goats. However, they are not normally as prevalent as sheep keds and are seldom a problem in flocks that are treated for keds. Symptoms of lice include severe itching by the animal, rubbing on fences and other surfaces to relieve irritation from the bites. They may rub and scratch to the point of denuding areas of skin. Heavy populations cause anemia and make animals more susceptible to respiratory and other diseases. The wool of infested flocks becomes ragged and inferior in quality. Lice are more of a problem in winter.

The African sheep louse, sheep-foot louse, and sheep body louse all suck blood from the animals, while the sheep-biting louse feeds on skin scales and wool fibers. Distribution and abundance of these species are not well known. Eggs are attached to the hairs, but can hatch for several weeks after being dislodged from the animals. Immature and adult lice can survive for a week off the host.

The eggs of the sucking lice hatch in 10 to 18 days; those of the biting louse, in 5 to 8 days ordinarily and in 10 days in cold weather. The young lice become mature, and the females begin laying eggs, about 2 weeks after hatching.

The bloodsucking sheep-foot louse is about $\frac{1}{12}$ inch long and dark gray or bluish. The head is about as long as it is wide. The foot louse is found on the legs in the short hairs below the true wool. Generally, it is not so damaging to sheep as the bloodsucking body louse or the red chewing louse.

The bloodsucking sheep body louse infests the entire body and face next to the skin, often clustering in large groups. It closely resembles the bloodsucking foot louse but is more slender, and the head is twice as long as broad and bluntly pointed in front. It is up to $\frac{1}{12}$ inch long and dark gray or bluish. The bloodsucking body louse injures sheep mainly by sucking blood. Usually the wool in the region where this louse has attacked is discolored and contains numerous brown particles, the excretions of the louse.

The sheep-biting or red chewing louse is $\frac{1}{20}$ inch long with a light brown body. The head is reddish and broadly rounded in front. When they cluster on the skin in large numbers, they may cause raw sores.

Seven species of lice may be found on goats. These include two species of bloodsucking lice, which are blue gray, and five species of chewing lice.

Wool Maggots (Fleece Worms). Wool maggots, the larvae of blow flies, live in wet, matted, and soiled wool around the anus of the animal and in wool surrounding wounds. The eggs are deposited in dirty wool or on wounds. After hatching, the maggots, which have blunt tails and pointed heads, spread over the animal and feed on dead tissue under the fleece. Maggot-infested sheep become restless, stamp their feet, try to bite the irritated areas, and may leave the flock to hide in

secluded places. Fatal secondary infections follow wool maggot attacks that are left untreated.

Control includes care and medication of wounds and early shearing, or clipping and cleaning dirty areas on the sheep before the spring blow fly season. After maggot infestation has occurred, spraying or dipping with recommended insecticides will control the maggots.

Blackflies (Buffalo Gnats). Blackflies are small, $\frac{1}{6}$ inch long, and humpbacked. They have stout legs and delicate wings. They suck blood from around the nostrils, ears, and eyes, inflicting painful wounds. This feeding activity by these flies causes huddling by the sheep,

thereby interfering with the normal feeding and watering behavior of sheep. For more details, see Biting Flies of Cattle.

CONTROL

Obtain control information of sheep and goat pests from current, local recommendations.

*Modified from "Control of Sheep Keds," EB1389, by A.L. Antonelli and T. Clark, Washington State University, 1979.

"Lice" and "Wool Maggots" modified from "Controlling Insects and Mites on Sheep and Goats," SC 244, by C.H. Collison, Pennsylvania State University, 1978.

LIVESTOCK TICKS AND THEIR CONTROL

Ticks are small animals, similar to insects and spiders. In an unfed condition, their bodies are oval, flattened, and appear hard and leathery. Adult ticks have eight legs; the larvae or “seed” ticks have only six. Larval ticks are very small, about $\frac{1}{40}$ inch long. The intermediate or nymphal stage is about $\frac{1}{16}$ inch; adults are about $\frac{3}{16}$ inch. Fully engorged females of common species can expand to $\frac{1}{2}$ inch in length and are more spheroid.

Ticks feed exclusively on the blood of animals, piercing the host's skin with their mouth parts. A series of barbs along the shaft of the mouth parts anchor the head of the tick to the host's skin, making removal difficult. Unless the tick is removed, it remains feeding from several hours to many days before becoming fully engorged. Only then will it release its hold and drop from the host to molt or lay eggs.

Two major kinds of ticks live in Washington—host ticks (Ixodidae) and nest ticks (Argasidae).

Three common kinds of host ticks in Washington bite humans and certain livestock. They are *Dermacentor andersoni* (the Rocky Mountain wood tick), *Dermacentor variabilis* (the American dog tick), and *Idoxodes pacificus* (a tick found in western Washington). These species are usually encountered outdoors in brushy, woodland areas. They feed on a variety of mammals, large and small. The brown dog tick, *Rhipicephalus sanguineus*, is primarily a pest of dogs and only rarely bites humans. It lives in dog kennels, houses, and other areas where dogs are kept, including human habitations.

LIFE CYCLE

The life cycles of all species of ticks are similar, although the host range and duration of life stages vary. All are multi-host ticks. Three separate blood meals, generally from hosts of a different size, are required to complete the stages of development. The tick leaves the host at the end of each blood meal to molt or lay eggs. The brown dog tick also

requires three blood meals, but the dog serves as host for each meal.

Once an adult female has mated and become fully engorged with blood, she drops from the host to seek a protected place to lay eggs. Thousands of eggs are laid in a period of 10 days to 3 weeks. The eggs hatch in about a month and the small six-legged larvae crawl up on vegetation to await a passing host.

The larvae host ticks usually feed on small rodents. They feed for a few days, drop from the host, and seek shelter for the molt to the nymphal stage. After transforming into an eight-legged nymph, the tick crawls onto vegetation and attaches to a passing animal. This stage can be found on larger hosts, such as jack rabbits. The nymph feeds for a few days, drops from the host, and transforms into an adult. Adult ticks are common on deer, horses, cattle, sheep, and other large animals. The adult stage most often attacks people.

The life cycle can last up to 3 years, although 2 years is more common. Unfed nymphs and adults persist throughout the winter and seek new hosts in the spring. A blood meal is necessary before the tick can transform into the next growth stage, or before the adult female can lay eggs. The common species of ticks can live several years without feeding.

Nest ticks are more secretive, and most species feed on birds and rodents. They also will feed on humans. Nest ticks attach and feed very rapidly so they are rarely detected. They feed on resting humans and livestock and will crawl considerable distances to reach a nesting animal. Molting takes place after a complete blood meal. Because of the short time of contact with the host, these ticks are concentrated in bedding or nest sites of mammals and birds.

SEASONAL ABUNDANCE

Ticks are most active in spring when vegetation begins to grow. By July or August (in higher elevations), adults or nymphs, which

have not found a host, seek a protected site to avoid summer heat. Ticks are most abundant in brushy areas where vegetation is sufficient to support both large and small animals. They concentrate near trails and openings where they are likely to encounter passing hosts.

The brown dog tick differs in its pattern of seasonal activity because it is closely associated only with canine hosts. All of the life stages can be found at any time of the year in buildings used by dogs. When not feeding, the ticks hide in cracks, corners, behind picture frames or moldings of buildings where dogs are housed. A favorite site for feeding on dogs is between the toes.

DISEASE ASSOCIATED WITH TICKS

Tick bites are potentially dangerous to humans both from the effects of the bite itself and from transmitted microbes that cause disease. Throughout the United States, Rocky Mountain Spotted Fever (RMSF) is transmitted by the Rocky Mountain wood tick, the American dog tick, and to a lesser extent by the brown dog tick. In Washington, only two or three human cases of RMSF occur annually. The brown dog tick and the American dog tick also can spread malignant jaundice to canines. Tularemia or "rabbit fever" is transmitted to humans by the American dog tick and the Rocky Mountain wood tick.

Nest ticks also transmit disease agents. Humans usually are exposed when sleeping in cabins or outdoor shelters that also are used by wild rodents. These ticks transmit Relapsing Fever.

Nest ticks also transmit a number of agents of poultry diseases. The bite of nest ticks also can be dangerous. Many people show extreme local hypersensitivity to the bite of these ticks.

The bite of the tick itself can cause dermatitis (an inflammation of the skin), secondary infections, and in the case of host ticks, a condition known as tick paralysis. Instances of tick paralysis are rare. It is caused by the feeding of a female tick. The tick introduces a toxin (Ixovotoxin) while feeding, which causes an ascending type of paralysis. Early removal of the tick results in the rapid and complete recovery of the affected animal or person. Failure to remove the tick results in progression of the ascending paralysis until death.

CONTROL

Obtain control recommendations for ticks on livestock from current, local sources. Control and prevention of ticks on humans and pets can be obtained from MISC0151, "Public Health Pest Control," by Carol A. Ramsay and Gary L. Thomasson, Washington State University, 1993.

Remove ticks from humans or pets. Removal of ticks is difficult: grasp the tick as close to the point of attachment as possible and flip the tick so it is belly up (that side where the legs are attached), then carefully pull steadily until the tick is released. Deodorized kerosene applied topically will cause a tick to detach voluntarily in most cases. These chemicals may be used to supplement physical removal. Apply a local antiseptic to the site of attachment after removal.

HORSE PESTS AND THEIR CONTROL *

HORSE BOTS

Horse bots are the larvae of flies that have become highly specialized as parasites of horses. Three species of horse bots attack horses in the Pacific Northwest—the common horse bot, the throat bot, and the nose bot.

Bot flies have four stages, the adult, egg, larva or bot, and pupa. In the western states, the adult flies appear about June and remain active until frost. During this time, the short-lived adult flies follow their sole purpose—reproduction. The female fly hovers and darts about the horses and lays her eggs, gluing them to the hairs of the horse's body. Each species has its preferred laying site. It is at this time that many horses react to the bot flies in a characteristic manner. The reaction varies somewhat among horse breeds.

Nose or throat bots cause horses to walk about throwing their heads violently; if this fails, the horses begin to run seeking shade or shelter. If the horses are being ridden when flies are active, they become skittish, unmanageable, sometimes running away or throwing the rider.

Most eggs of the common bot are glued onto the hairs of the lower front legs of the animals. The eggs hatch several days after they are laid, but hatching does not take place until they are rubbed by the warm moist lips of the horse. The eggs may remain for several weeks, but as soon as this stimulus occurs the larvae emerge and attach themselves to the mucous membranes of the mouth. The larvae then penetrate the mucous membranes of the tongue and gums. They burrow in the gums for about 1 month and finally migrate to the stomach where they attach to the lining of the stomach by means of strongly developed mouth hooks.

Eggs laid by the throat bot fly are deposited on the hairs of the throat and lips. The friction stimulus is not required to cause the eggs of the throat bot to hatch. The larvae hatch and crawl into the animal's mouth, lodging between the teeth and in gum pockets in the mouth. In about 1 month, the larvae move into the stomach and attach to the lining of the stomach.

The female of the nose bot fly darts in and lays her eggs on the hairs of the lips and mouth. The eggs hatch in a few days and burrow in the mucous membrane of the lips and gums; here they stay for about 1 month. The larvae then migrate to the stomach and attach to the lining of the stomach. The majority of the larvae attach to the lining near the pylorus, or exit of the stomach into the intestine.

Larvae of all three species of horse bots require about 10 months to develop, eventually passing out of the intestine in the feces. Pupation follows either under or in the fecal pile.

The larvae of the nose bot will attach themselves in the rectum and anal region before finally dropping to the soil to pupate. At this time the horse will exhibit discomfort by rubbing or switching its tail.

Much of the damage by bots is not recognized, yet the damage caused in the gums and to the digestive tract is important to the health of horses. Treatment is generally administered no earlier than 1 month after the first killing frost. Greatest success is obtained by treating in early winter, either in December or January. Horses of higher value may be treated more frequently. Eggs of the common horse bot can be washed weekly with warm water and a sponge to cause hatching and thus prevent infection.

BLOOD SUCKING AND NUISANCE FLIES

Certain flies including mosquitoes will annoy horses on the pasture or in the barn lot or the arena. They cause pain and discomfort to the horse, at times, making them unmanageable while they are being ridden or shown.

STABLE FLIES

Stable flies breed in decaying vegetable matter around the farmstead. Adult flies feed on the blood of mammals. They normally roost on walls, trees, or fences in the shade. Once or twice a day they come to an animal, feed vigorously for a minute and then leave to roost on the building and digest their meal. Feeding by stable flies causes animals much discomfort and causes them to switch and kick viciously.

Cleanup and sanitation serve to break up breeding areas and contribute a good deal toward fly control. For stable flies, one can use a good residual spray on the buildings and fences to kill resting flies as they roost.

HORSE FLIES AND DEER FLIES

Horse flies and deer flies are large robust flies that suck blood from a wide range of mammals. Their larvae appear in moist soil or in standing or running water that is fairly shallow. The bite of the adult is extremely painful and causes horses a great deal of discomfort; however, they are not as numerous in the Pacific Northwest as the other flies.

FACE FLIES AND NUISANCE FLIES

Face flies do not suck blood, but are a severe nuisance to livestock. They sit on the mucous membranes of the eyes and nostrils to feed. This feeding sets up a local irritation and considerable discomfort to horses and domestic livestock. Other nuisance flies or blood sucking flies are a discomfort to horses, either on pasture or while being ridden. Some will feed on blood oozing from bites of horse flies. All of these flies, except mosquitoes and punkies, attack horses outdoors only.

A number of prepared repellent mixtures may be applied to horses to ward off the attack of nuisance flies. These preparations are applied as sprays from a "flit gun," as "wipe-ons" or from an aerosol "bomb."

A single application just before riding is usually enough. One should be careful not to over-apply these materials. This is not from the standpoint of the chemical pesticide, but the oil with which it is formulated. Over-use of oil-based pesticides could cause skin irritation, and the animal may develop a dandruff condition. In more advanced cases the skin may become blistered, and some hair loss results. While the repellent preparations are effective, use no more than the label recommends.

MOSQUITOES

Mosquitoes are a special discomfort to horses on pastures, especially during early spring in

wet years. Mosquitoes may be severe enough to warrant keeping horses in the barn at night and turning them out only during daylight hours.

Using aerial spraying on the pasture and surrounding area with a registered pesticide will alleviate mosquitoes and nuisance flies for a short time per spraying. Remove horses from the pasture at the time of spraying because of their fear of the applicator plane. Because most mosquitoes do not move far from aquatic breeding sites, an effective control measure is breeding site reduction or elimination.

With the onset of West Nile Virus across the country and the implications for equine health, it is necessary to briefly address the disease here. While certain birds are the primary host, there are mammals that are dead-end hosts, some of which are harmed more by the disease than others. Horses are particularly susceptible. From information garnered from the Department of Ecology and Department of Health, it is anticipated that 30–40% of infected horses showing symptoms will die or be permanently disabled. Thus, it is imperative that horse owners have their horses vaccinated before the next mosquito (the vector) season begins (April). Why the urgency? It is because **2 doses, 3–6 weeks apart are required, and immunity is not achieved until 5 or 6 weeks after the second dose.** This also requires an annual booster. Only a veterinarian can perform the vaccination.

HORSE LICE

Lice feed on the blood of horses. Rarely, horses become anemic and run down. Horses also will rub excessively, wearing the hair coat in patches. Young lice hatch from yellow eggs glued to the horse's hair. They grow to adults in 2 or 3 weeks. Lice can be spread from one horse to another by currycombs, blankets, saddles, and direct contact.

CONTROL

Obtain more specific information for control of horse pests from current, local recommendations.

*Modified from "Parasites of Horses," FS 517, by J.H. Bailey, et al., South Dakota State University, 1976.

CONTROL OF PESTS OF SWINE*

HOG LOUSE

The hog louse is dull gray brown and $\frac{1}{4}$ inch long. It pierces the hog's hide, removing blood through tubelike mouth parts.

The hog louse lives in clusters. During cold weather it appears especially inside the legs and ears, and the folds of the skin of the neck. But any part of the animal's body that offers protection may harbor the pest.

Eggs are laid throughout the winter and are glued to the hairs close to the skin. During this time of year, eggs take about 2 to 3 weeks to hatch, and the immature stage lasts 2 weeks. Immature stages and adults live entirely on the animals, except when they fall off accidentally.

SARCOPTIC MANGE OR ITCH MITE

Sarcoptic mange or itch is caused by a small ($\frac{1}{50}$ inch long) white or yellow mite that burrows into the hide. An animal having sarcoptic mange is unthrifty: its hide is rough and scaly, the hair stands erect, and it rubs against objects such as fence posts and corners of buildings.

The areas around the eyes, ears, and along the top of the back and neck are more often affected. These places may be scabby and

covered with pimples. The problem occurs usually in the fall, winter, and spring.

The mange mite tunnels into the skin. The slender, winding tunnels of the mites are nearly 1 inch in length and occur throughout the infested part of the body. Eggs are laid in the tunnels; they hatch in 3 to 10 days. Under favorable conditions, the mites can complete a generation (brood) in 2 weeks.

Sarcoptic mange is highly contagious. The mites and their eggs can live in bedding and other places for weeks without food, making infestation or reinfestation of healthy animals easy.

OTHER PESTS

Stable flies, horse flies, deer flies, blackflies, and probably other flies attack pigs. The biologies of these flies are described under other livestock, such as cattle and horses.

CONTROL

Obtain information on control of swine pests from current, local recommendations.

*Modified from "Controlling Insects and Mites of Swine," EB E-448, by R.L. Jones and A. Wells, Michigan State University, 1964.



Use pesticides with care. Apply them only to plants, animals, or sites listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

College of Agricultural, Human, and Natural Resource Sciences

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